

CLAIMS

What is claimed is:

1. A storage apparatus for sequentially writing a plurality of blocks of data on a data recording medium, said storage apparatus comprising:

a sequential writing unit for sequentially associating and writing a plurality of blocks of data including a single block on a data recording medium, said single block comprising data and validity information indicating whether or not said data contained in said single block is valid;

an error detecting unit for detecting when said writing of said single block by said sequential writing unit causes said validity information of said single block to be written in an error area and for generating a write-error signal in response to said detecting;

a write-area changing unit for changing a location on said data recording medium of an additional block written to a first write-area before said single block, wherein said write-area changing unit writes said additional block, excluding said validity information of said additional block, to said error area and writes said validity information of said additional block to an area other than said error area; and

an error-circumventing unit for writing said single block in a second write-area on said data recording medium, said second write-area following said error area.

2. The storage apparatus of claim 1, wherein said write-area changing unit includes means for changing the write-area of said additional block by rewriting said additional block as a reformatted block, said reformatted block including data in said additional block and a redundantly duplicated part of said data contained in said additional block, in substitution for said additional block initially written by said sequential writing unit.

3. The storage apparatus of claim 1, wherein:

said error detecting unit further comprises means for detecting whether validity information of said single block is written in a storage area having a predetermined displacement from said single block;

said error detecting unit further comprises means for detecting that said validity information of said single block is written in said error area in response to detecting a write error within said storage area; and

said write-area changing unit further comprises means for changing said write-area of said additional block to selectively prevent a first part of said additional block from being written within said storage area and to selectively cause a second part of said additional block that follows said first part to be written in said error area.

4. The storage apparatus of claim 1, wherein said error detecting unit further comprises means for detecting that said validity information of said single block that is to be recorded contiguously to said additional block is written in said error area; and

said write-area changing unit further comprises means for writing a block fragment that is a part of said additional block into an area in which said additional block is written by said sequential writing unit and for writing data of said additional block contiguously to said block fragment to change the write-area of said additional block, excluding said validity information, to said error area.

5. The storage apparatus of claim 4, wherein said single block further comprises a data recency indicator for indicating the recency of data to be newly written with respect to data already written.

6. The storage apparatus of claim 4, wherein said single block further comprises a data recency indicator for indicating the recency of data to be newly written with respect to data already written; and

said write-area changing unit includes means for associating and writing a data recency indicator higher than the data recency indicator of said block fragment written by said write-area changing unit with said additional block to be written in an area that follows said error area.

7. The storage apparatus of claim 1, wherein said write-area changing unit includes means for changing the write-area of said additional block by rewriting said additional block as a reformatted block, said reformatted block including data in said additional block, in substitution for said additional block initially written by said sequential writing unit.

8. A method of sequentially writing a plurality of blocks of data on a data recording medium, said method comprising:

sequentially writing a single block on a data recording medium, wherein said step of sequentially writing further comprises creating a single block comprising data and validity information indicating whether or not said data contained in said single block is valid;

detecting when said sequential writing of said single block causes said validity information of said single block to be created in an error area;

in response to said detecting step, generating a write-error signal;

changing a location on said data recording medium of an additional block stored in a first write-area before said single block, wherein said changing further comprises rewriting said additional block, excluding said validity information of said additional block, to said error area and rewriting said validity information of said additional block to an area other than said error area; and

storing said single block in a second write-area on said data recording medium, said second write-area following said error area.

9. The method of claim 8, wherein said changing step further comprises changing the write-area of said additional block by rewriting said additional block as a reformatted block, said reformatted block including data from said additional block and a redundantly duplicated part of said data from said additional block, in substitution for said additional block.

10. The method of claim 8, wherein:

said detecting step further comprises detecting whether validity information of said single block is stored in a storage area having a predetermined displacement from said single block;

in response to detecting a write error within said storage area, detecting whether said validity information of said single block is written in said error area; and

changing said write-area of said additional block to selectively prevent a first part of said additional block from being written within said storage area and to selectively cause a second part of said additional block that follows said first part to be written in said error area.

11. The method of claim 8, wherein said detecting step further comprises detecting that said validity information of said single block is to be recorded contiguously to said additional block and in said error area; and

writing a block fragment into an area in which said additional block is written and writing data from said additional block contiguously to said block fragment to change the location of said additional block, excluding said validity information, to said error area.

12. The method of claim 8, wherein sequentially writing said single block further comprises writing a data recency indicator for indicating the recency of data to be newly written with respect to data already written.

13. The method of claim 8, wherein sequentially writing said single block further comprises writing a data recency indicator for indicating the recency of data to be newly written with respect to data already written; and

writing a data recency indicator higher than the data recency indicator of said block fragment written by said write-area changing unit with said additional block to be written in an area that follows said error area.

14. The method of claim 8, wherein the step of changing the write-area of said additional block further comprises rewriting said additional block as a reformatted block, said reformatted block including data from said additional block.

15. A computer program product in a computer-readable medium for sequentially writing a plurality of blocks of data on a data recording medium, said computer program product comprising:

a computer-readable medium;

instructions on the computer-readable medium for sequentially writing a single block on a data recording medium, said single block comprising data and validity information indicating whether or not said data contained in said single block is valid;

instructions on the computer-readable medium for detecting when said writing of said single block causes said validity information of said single block to be written in an error area;

instructions on the computer-readable medium for, in response to said detection, generating a write-error signal;

instructions on the computer-readable medium for changing a location on said data recording medium of an additional block written to a first write-area before said single block, wherein said changing instructions comprise instructions for rewriting said additional block, excluding said validity information of said additional block, to said error area and instructions for rewriting said validity information of said additional block to an area other than said error area; and

instructions on the computer-readable medium for writing said single block in a second write-area on said data recording medium, said second write-area following said error area.

16. The computer program product of claim 15, wherein said changing instructions further comprise instructions on the computer-readable medium for changing the location of said additional block by writing a reformatted block, said reformatted block including data in said additional block and a redundantly duplicated part of said data contained in said additional block, in substitution for said additional block.

18. The computer program product of claim 15, wherein said detecting instructions further comprise instructions on the computer-readable medium for detecting that said validity information of said single block is to be recorded contiguously to said additional block and is to be written in said error area; and

said instructions for writing said single block in said second write-area further comprise instructions on the computer-readable medium for writing a block fragment that is a part of said additional block into an area in which said additional block is written and writing data of said additional block contiguously to said block fragment.

19. The computer program product of claim 8, wherein said writing instructions further comprise instructions on the computer-readable medium for indicating the recency of data to be newly written with respect to data already written; and

said writing instructions further comprise instructions on the computer-readable medium for writing a data recency indicator higher than the data recency indicator of said block fragment, with said additional block being written in an area that follows said error area.

20. The computer program product of claim 15, wherein said changing instructions further comprise instructions on the computer-readable medium for changing the write-area of said additional block by rewriting said additional block as a reformatted block, said reformatted block including data in said additional block, in substitution for said additional block initially written by said sequential writing unit.